Endoscopic removal of a molariform supernumerary intranasal tooth (heterotopic polyodontia) in a horse

Monica C. de Mira, Med Vet; Claude A. Ragle, DVM, DACVS, DABVP; Kristin B. Gablehouse, DVM; Russell L. Tucker, DVM, DACVR

Case Description—A 3-year-old Thoroughbred mare was evaluated because of abnormal upper respiratory tract sounds (that had become apparent during race training) of 3- to 4-months’ duration.

Clinical Findings—On initial physical evaluation, there were no abnormal findings. During trotting, an abnormal upper airway expiratory sound was audible. Endoscopic examination revealed a small mass protruding into the right ventral nasal meatus. Radiographic images of the skull revealed no abnormal findings. Computed tomography of the head revealed an abnormal structure in the same location as the mass that was observed during endoscopy. The X-ray attenuation of the mass was identical to that of dental tissue.

Treatment and Outcome—The mass was surgically removed with endoscopic guidance. On gross examination, the excised mass appeared to be a nearly normal molariform tooth. Histologic examination revealed that it was a well-formed tooth, with no other associated cellular populations. The mass was determined to be a molariform supernumerary intranasal tooth. Six months following discharge from the hospital, the trainer reported that the abnormal respiratory tract sound was no longer audible. During a follow-up endoscopic examination performed at the training facility, no abnormalities were detected.

Clinical Relevance—in horses, an intranasal tooth should be considered as a differential diagnosis for expiratory stridor. Clear definitions of heterotopic polyodontia, dentigerous cyst, and temporal teratoma can be used to clinically diagnose these separate anomalies. In the horse of this report, computed tomographic findings contributed to determination of a diagnosis and formulation of a treatment plan. (J Am Vet Med Assoc 2007;231:1374–1377)

A 3-year-old Thoroughbred mare that weighed 517 kg (1,137 lb) was referred to the Washington State University Veterinary Teaching Hospital with a history of abnormal upper respiratory tract sound of 3 to 4 months’ duration, which first became apparent during race training. Results of an endoscopic examination via the left nasal passage performed by the referring veterinarian were considered normal. On initial physical evaluation at the hospital, there were no abnormal findings. Auscultation of the thorax revealed no abnormalities and abnormal nasal discharge was not evident. Results of a CBC were within reference limits. Expiratory stridor was audible during trotting.

Endoscopic examination of the respiratory tract revealed a small nasal mass (approx 1 cm in diameter) that was covered by noneroded nasal mucosa (Figure 1). The mass protruded into the right ventral nasal meatus from the ventrolateral wall, approximately 15 cm caudal to the nares. Passage of a 9.5-mm-diameter endoscope was obstructed by the mass. The endoscope was passed through the left ventral nasal meatus, and the left nasal passage appeared normal.

Figure 1—Endoscopic view of the right ventral nasal meatus of a horse that was evaluated because of abnormal upper respiratory tract sounds. Notice the small nasal mass (arrows), approximately 1 cm in diameter, that is covered by noneroded nasal mucosa. Dorsal is toward the top of the image.
Standing dorsoventral and lateral radiographic images of the skull were obtained, and no abnormal findings were evident. Computed tomography of the head revealed an abnormal structure that originated from the palatine bone; the x-ray attenuation of the structure was identical to that of dental tissue. The structure was embedded in the soft tissue of the ventrolateral wall of the right ventral nasal meatus, at the level of the right maxillary third premolar, and was in the same location as the mass that had been detected endoscopically (Figure 2). On the basis of the CT examination findings, the differential diagnoses included ectopic tooth; dentigerous cyst; a primary dental tumor, such as a simple odontoma, compound or complex odontoma, ameloblastic odontoma, or ameloblastoma; and a primary, nondental, calcareous tumor, such as an osteoma.

Surgical removal of the mass was recommended. Cefazolin sodium (10 mg/kg [4.5 mg/lb], IV), gentamicin sulfate (4.4 mg/kg [2.0 mg/lb], IV), and flunixin meglumine (1.1 mg/kg [0.5 mg/lb], IV) were administered prior to surgery. The horse was anesthetized and placed in left lateral recumbency. An endoscope was passed through the right nostril, and the mass was located. Epinephrine (1:10,000) was infiltrated around the mass to minimize hemorrhage during excision.

Straight-angled, 9-inch scissors were used to dissect the mass from the underlying tissues. Laparoscopic forceps were then inserted through the right nostril and used to remove the mass. This procedure was accomplished without complications. Flunixin meglumine (1.1 mg/kg, IV) and 2 doses of cefazolin sodium (10 mg/kg, IV, q 6 h) were administered after surgery; the horse was allowed to recover from anesthesia.

The horse developed mild serosanguineous discharge from the right nostril, but this had resolved by the end of the fifth day after surgery. Follow-up endoscopic examination of the right nasal passage was performed on the seventh day following surgery. There was a slight reduction in airway diameter at the surgical site as a result of the formation of granulation tissue in the ventral meatus. The horse was discharged from hospital 16 days following surgery.

On gross examination, the excised mass resembled a nearly normal molariform tooth (1 X 1 cm [0.4 X 0.4 inches]) that had a central pulp cavity and laminated deposits of cementum and dentin. Histologic examination revealed a well-formed tooth, with no other associated cellular populations.

Six months following the horse’s discharge from the hospital, the trainer reported that the abnormal respiratory sound was no longer audible, but a fluttering noise could be heard when the horse was galloping. A follow-up endoscopic examination that was performed at the training facility revealed no abnormalities.

Discussion

In the horse of this report, the main complaint was an abnormal expiratory sound during exercise. Upper respiratory tract-related causes of expiratory stridor in horses include dorsal displacement of the soft palate, idiopathic left laryngeal hemiplegia, axial deviation of the aryepiglottic folds, epiglottic entrapment, epiglottic hypoplasia, arytenoid chondritis, progressive ethmoidal hematoma, pharyngeal cysts, hyperkalemic periodic paralysis, maxillary sinus cysts, and nasopharyngeal collapse. Airflow obstruction associated with respiratory stridor can also be caused by nasal neoplasia, nasal polyps, nasal amyloidosis, or by nasal bone lesions of osteodystrophia fibrosa. Although uncommon, an intranasal tooth should also be considered as a differential diagnosis of respiratory stridor in horses.

The anatomic complexity of the equine head results in radiographic superimposition of many structures. Computed tomography can contribute useful information for diagnosis and treatment planning that conventional radiography is unable to provide. In the horse of this report, the lesion was not evident in conventional radiographic views, and CT was instrumental in localizing the structure that was subsequently identified as an ectopic intranasal tooth. Following detection of the lesion via CT, a board-certified radiologist retrospectively evaluated the conventional radiographic views and was still unable to identify the lesion in those images.

An intranasal tooth is an unusual form of heteroplastic polyodontia, and occurrences in horses or any other nonhuman animal species have not been previously described to the authors’ knowledge. Polyodontia is defined...
as the presence of supernumerary teeth (teeth in excess of the normal dental formula). Heterotopic polyodontia is defined as a supernumerary tooth (or teeth) located outside of the dental arcades. In humans, complications associated with supernumerary teeth include dental impacts, delayed or ectopic eruption of adjacent regular teeth, dental crowding, development of diastema, ectopic eruption (eg, into the floor of the nasal cavity), and formation of dentigerous cysts.

In humans, intranasal teeth develop rarely and have been described as being deciduous, permanent, or supernumerary. In horses, ectopic or heterotopic teeth have been associated only with supernumerary teeth. Supernumerary molariform teeth seem to be less common than supernumerary incisors. In horses, supernumerary teeth are considered a congenital condition because they result from an inappropriate differentiation of dental germinal tissue during gestational development.

Maleruption of maxillary premolar teeth secondary to tooth bud displacement caused by head trauma has been reported in a filly. As a result, horizontal impaction of the left maxillary third and fourth premolars developed, which was associated with maxillary swelling, diffuse rhinitis, and narrowing of the left nasal passage between the first and fifth maxillary cheek teeth in that horse.

In the horse of this report, heterotopic polyodontia was identified, but no other developmental abnormalities of dentition were detected via oral, radiographic, or CT examinations. The dentition was complete, wolf teeth and canines were absent, and the presence of dental caps matched the age of the horse. Therefore, we concluded that the ectopic tooth was a molariform supernumerary tooth.

In 1 study, intranasal teeth were successfully extracted via endoscopy from 13 humans. In 2 patients, the teeth were ectopic canines; in the remainder, the extracted teeth were supernumerary and did not resemble normal, fully developed teeth, such as deciduous or permanent molars, premolars, or incisors. These 13 patients had a variety of clinical signs, including nasal obstruction, chronic nasal discharge, crusting of the nasal mucosa, localized nasal ulceration, nasal pain, epistaxis, nasal septal abscess, nasal-oral fistula, osteomyelitis of the maxilla, facial pain and headache, external deviation of the nose, and nasal septal perforation. The differential diagnoses included foreign body, rhinitis, tumor, exostosis, odontoma, bone sequestrum, and dentigerous cyst.

The term heterotopic polyodontia has sometimes been applied to the so-called ear tooth, a cystic lesion that develops in the temporal region of young horses and results from an inappropriate differentiation of dental germinal tissue during gestational development.

Dentigerous cysts are epithelium-lined cysts that form around the crowns of unerupted teeth; they develop only rarely in dogs and cats, although they have been reported to develop in association with vestigial wolf teeth in horses and vestigial canines in mares. The criteria for identifying dentigerous cysts have not been applied consistently in the veterinary medical literature. Dentigerous cysts develop when the reduced enamel epithelium (odontogenic epithelium) of the tooth-forming organ is retained. In dentigerous cysts in dogs and humans, there is a cyst lining of stratified squamous epithelium. Although the exact histogenesis of dentigerous cysts is not known, they can develop secondary to impeded tooth eruption. Dentigerous cysts can also cause displacement of a tooth and result in noneruption. In the horse of this report, there was no epithelial lining present around the excised tooth. Therefore, we concluded that this was a case of true heterotopic polyodontia.

References

13. Hunt RJ, Allen D, Mueller PO: Intracranial trauma associated with

Selected abstract for JAVMA readers from the American Journal of Veterinary Research

Assessment of exercise-induced alterations in neutrophil function in horses
Douglas C. Donovan et al.

Objective—To evaluate the effects of a standardized exercise test to exhaustion in horses on leukocyte function ex vivo.

Animals—6 Thoroughbred geldings.

Procedures—Blood samples were obtained from each horse before exercise; at exhaustion (termed failure); and at 2, 6, 24, 48, and 72 hours after exercise to evaluate hematologic changes, rate of leukocyte apoptosis, and leukocyte production of reactive oxygen species (ROS) ex vivo. To assess leukocyte function, leukocyte ROS production in response to stimulation with lipopolysaccharide, peptidoglycan, zymosan, and phorbol myristate acetate was evaluated. Apoptosis was evaluated via assessment of myeloperoxidase activity in leukocyte lysates.

Results—in response to lipopolysaccharide, production of ROS by leukocytes was significantly increased at 2 hours and remained increased (albeit not significantly) at 6 hours after exercise, compared with the pre-exercise value. In the absence of any stimulus, leukocyte ROS production was significantly increased at 6 and 24 hours after exercise. In contrast, ROS production in response to phorbol myristate acetate was significantly decreased at 6, 24, and 72 hours after exercise. Leukocyte ROS production induced by zymosan or peptidoglycan was not altered by exercise. Leukocytosis was evident for 24 hours after exercise, and neutrophilia was detected during the first 6 hours. A significant increase in the rate of leukocyte apoptosis was detected at failure and 72 hours after exercise.

Conclusions and Clinical Relevance—Results indicated that strenuous exercise undertaken by horses causes alterations in innate immune system functions, some of which persist for as long as 72 hours after exercise. (Am J Vet Res 2007;68:1198–1204)